Treating urinary retention

(Leczenie zatrzymania moczu)

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Abstract – The authors have described the procedures for urinary retention treatment. They have emphasised the fact that the basic method of relieving a patient's pain is a bladder catheter. Most urologists decide to insert a Foley catheter into the bladder via urethra, but the choice of the catheter is dependent on the patient's needs. Catheters are made of various kinds of plastic (silicone, latex, and polyurethane) which makes it flexible, but also increases the risk of incrustation and allergy. It has also been emphasised that in some situations, it is impossible to insert the Foley catheter into the bladder, which compels one to perform urostomy. What has also been emphasised it the role of rehabilitation and the use of intraurethral devices, such as *Autocath 100* or *In-Flow*, in women.

Key words **-** urinary retention treatment, catheter, urostomy, intraurethral devices.

Streszczenie – Autorzy zasady postępowania w zatrzymaniu moczu. Podkreśli, że podstawowym sposobem złagodzenia bólu u pacjenta z zatrzymaniem moczu jest założenie cewnika do pęcherza moczowego. Większość urologów decyduje się w takim przypadku na założenie cewnika Foley'a do pęcherza moczowego przez cewkę moczową, aczkolwiek wybór cewnika jest zależny od potrzeb pacjenta. Cewniki produkowane są z różnego rodzaju mas plastycznych (silikon, lateks i poliuretan) nadających im odpowiednią elastyczność, ale jednocześnie zwiększające ryzyko inkrustacji i uczuleń. Zwrócono także uwagę, że w niektórych przypadkach niemożliwym jest wprowadzenia cewnika Foleya do pęcherza moczowego, co powoduje konieczność wykonania urostomii. Podkreślono także rolę rehabilitacji i zastosowanie u kobiet urządzeń wewnątrzcewkowych takich jak *Autocath 100* lub *In-Flow*.

Słowa kluczowe **-** postępowanie w zatrzymaniu moczu, cewnikowanie, urostomia, urządzenia wewnatrzcewkowe.

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I. COMPLETE DETRUSOR UNDERACTIVITY TREATMENT

Complete detrusor underactivity caused by neurological damage cannot be treated pharmacologically. Only partial underactivity can be aided with the use of medications (e.g. Ubretid, Urecholine, or Myocholine).

Patients with complete detrusor underactivity should unfortunately be treated by securing periodical urine discharge. The exception is a small percentage of young women with functional stomach muscles, who can be taught to empty their bladder using abdominal press.

A functional bladder outlet obstruction, especially one located at the bladder neck level, can most frequently be treated using selective alpha-1-blockers, such as Cardura, Dalfaz, Hytrin, or Omnic. In the case when a decision is made not to undertake pharmacological treatment, the patient should be taught self-catheterisation or an intraurethral

device should be used. In women, the surgical treatment based on sphincter incision should not be applied. The anatomy of a woman's urethra makes this approach impossible, as the urethra is conjoined with the vaginal wall along its length. The attempts at incising the sphincter usually end up with complications, causing urethrovaginal or vesicovaginal fistulas. It sometimes is the case that urinary retention is a consequence of genital prolapse. In such cases, the surgical procedure of removing the uterus restores proper micturition [1-4].

In the cases when self-catheterisation is ineffective for anatomic reasons, one should consider vesicostomy to aid self-catheterisation.

II. INTRAURETHRAL DEVICES

Theoretically, the perfect solution in the treatment of urinary retention in women is the use of intraurethral devices such as *Autocath 100* or *In-Flow*.

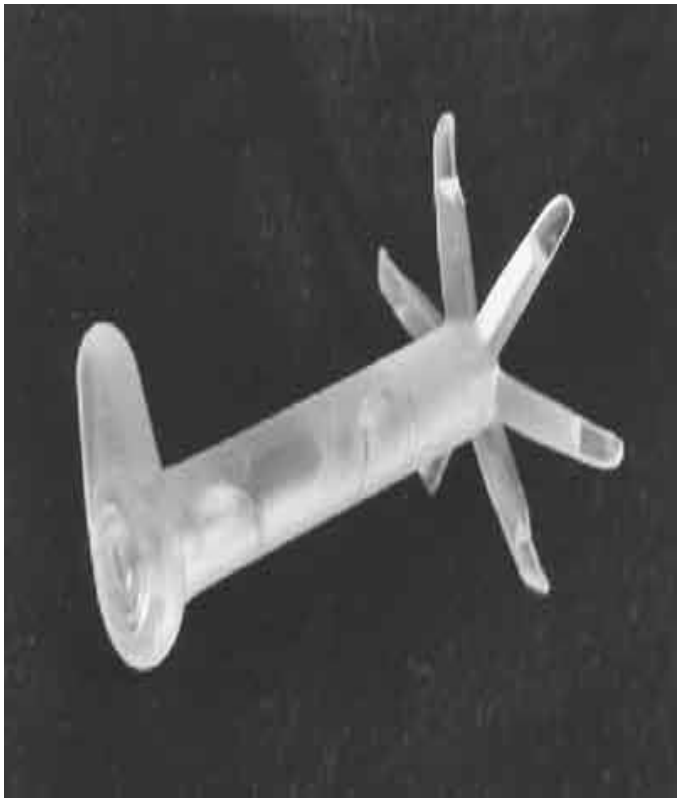

Figure 1. The *Autocath 100* intraurethral device [5]

The *Autocath 100* intraurethral device is made of a silver-coated metal alloy that is neutral for the organism. The diameter and length are adjusted to the patient's urethra. By turning the ring, one can adjust the opening pressure for a particular patient. Inside the device, there is a valve mechanism to regulate the pressure. When the patient wants to urinate, a temporary rise of intra-abdominal pressure is caused – it lasts several seconds, until the valve mechanism is open. Then the patient urinates and the urine flows until the bladder is empty. When the urine flow stops, the valve mechanism closes and the urine is retained. Maintaining proper opening pressure for several seconds is necessary to prevent an uncontrolled opening of the valve mechanism during a shorter rise of the pressure, for example one experienced when sneezing or coughing. The *Autocath 100* device should be periodically removed from urethra, cleaned of all urine residues, and sterilised before being installed again. The device is inserted by a doctor using special equipment [5].

Another intraurethral device that performs the same role, and yet functions entirely differently, is *In-Flow.*

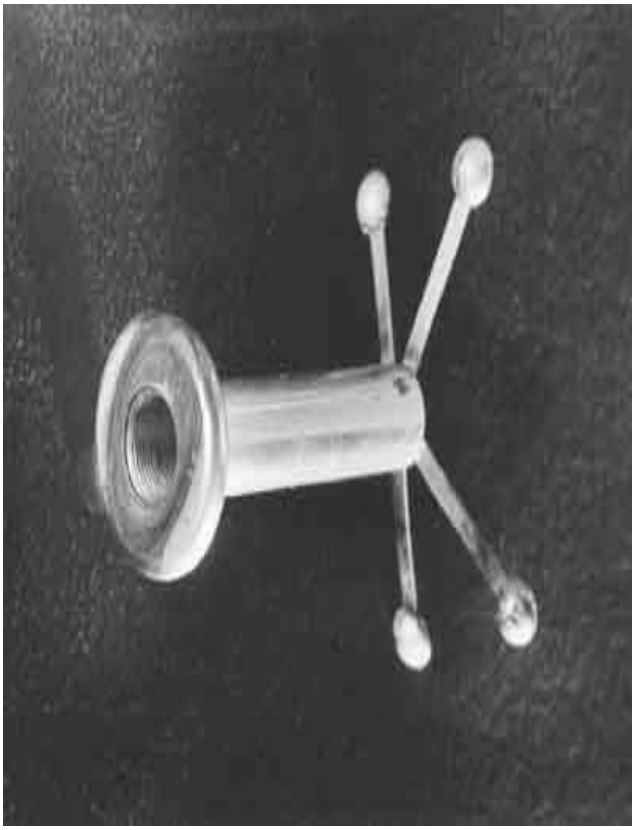

Figure 2. The *In-Flow* intraurethral device [5]

The *In-Flow* intraurethral device is made of silicon and it has a small metal turbine inside. It is a disposable device the patient can install herself. It comes in sterile packs with a plastic applicator. This device requires an external activator. The activator is a slightly curved plastic tube of about 15 cm length and 3 cm diameter. The lower part consists of an electromagnetic wave generator and the upper part is a

slot for the common round disposable batteries. When the patient wants to urinate, she presses the activator against her interpubic joint and holding it like that, she pushes the button at its top. The electromagnetic field generated by the activator activates turbine inside the *In-Flow* device, which initiates the urine being sucked out of the bladder. Once the bladder is empty, one has to wait a while without moving the activator until the diode flashes and the sound signal is heard. This signifies that the valve mechanism inside the device has closed and the urine is not going to flow without the activation. The *In-Flow* device should be replaced every 4-6 weeks.

Both the intraurethral devices work perfectly, and the only problems that limit their use are high costs and intolerance.

All in all, it has to be said that the best method to treat urinary retention is, as long as its possible, neutralising the cause of this unpleasant ailment. However, when it is not possible, the most popular method is periodical self-catheterisation with respect to antiseptic and aseptic principles. Other methods of treatment have less significance, since there are additional factors limiting their use [3,4].

III. CATHETERISATION

A basic method of relieving the pain of a patient suffering with urinary retention is to catheterise the bladder. Most urologists make the decision to insert the Foley catheter to the bladder via urethra, but the selection of the catheter is dependent on the particular patient's needs [6,7].

Catheters are made of various kinds of plastic (silicone, latex, polyurethane) that allow them to be flexible. Some patients are allergic to latex, in which cases catheters coated with silicone or made of silicone are used – they can remain in the bladder for a longer period and they cause no incrustation or allergic reactions. Their disadvantage is a relatively high price. What is more, coated disposable catheters are also used. In their case, no additional gel is required.

The size of the catheter is given in the French gauge system (F) – it specifies the circumference in millimetres. If the size was recalculated to obtain the catheter diameter, 1F is equal to 0.33 mm, and the diameter of a 9F catheter is 3 mm, and an 18F catheter - 6 mm.

The currently used catheters are named after their inventors, and thus [6]:

- *Nelaton catheter* is one of the most commonly used straight tip catheter with one lateral hole at the end. It is made of rubber or soft types of plastic. It is a single-use catheter.
- *Couvelaire catheter* is a straight one with holes at the end and at the side. It is often used in cases of patients with haematuria, as its structure makes it possible for the urine to flow even if it contains blood clots. As it allows for a grater urine flow, it is better to be used for bladder washout.
- *Tiemann catheter* has a bent ending and conical tip. It is used in cases of men with enlarged prostate and people with narrow urethra. It is recommended in the cases when it is difficult to insert a straight catheter into the bladder.
- *Malecot and Pezzer catheters* are used to secure the proper urine flow in people who underwent surgeries. Inserted via a surgical wound, they are used to continuously drain the urine, which facilitates proper healing. These catheters are used to drain the bladder via the abdominal walls or a surgical vesicocutaneous fistula.
- *Foley catheter* is the most convenient self-maintaining catheter used for draining the bladder for a longer duration. This catheter is straight and it has two lateral holes and a balloon which protects against the catheter slipping out of the bladder. The balloon is placed over the lateral hole of the catheter. To the inside of it, sterile liquid is injected – most preferably water for injections (physiological saline is no good here, as the salt can crystallise, making it impossible to remove the saline, and as a consequence, also to remove the catheter from the bladder). The valve used to fill up the balloon is near the catheter outlet. Foley catheter is made of latex or silicone and it can also be silicone-coated. It is often used in the cases of patients who underwent certain surgical procedures and those in critical condition at an intensive care unit, in order to monitor the functioning of kidneys [6].

The catheter is inserted aseptically in a recumbent body position. Urine retained in the bladder is released in fractions in order to avoid a massive haematuria *ex vacuo*, caused by a sudden drop of pressure in the bladder, followed by bladder mucosa vessels bursting.

A few days after a Foley catheter is inserted, an attempt is made to remove the catheter from the bladder for hygienic reasons. The estimated percentage of successful attempts to remove the Foley catheter is around **33%**. The factors impacting the frequency of urinary retention include the age of the patient, the concentration of prostate-specific antigen (PSA), and the volume of the urine retained after micturition.

A relevant study in patients with urinary retention is abdominal ultrasonography, which allows one to discern the causes of the ailment (lithiasis, cancers, clots in the bladder). [8-11]

In the cases of men, the doctor should unconditionally perform a *per rectum* examination. This examination involves the insertion of a finger into the anus. It is performed to assess the tension of the anal sphincter, the size, symmetry, elasticity, and rough dimensions of the prostate, as well as its soreness [7].

IV. UROSTOMY

In case it is impossible to insert the Foley catheter into the bladder, an urostomy has to be performed.

The term "urostomy" refers to connections between the urinary tract (renal pelvis, ureters, bladder, or male urethra), and skin in order to secure a way for the urine to flow outside. There are two kinds of openings that can exist: those created surgically (stomas) and intrinsic (fistulas). This article refers only to the first kind, and urostomy in particular [12,13].

Urostomy can be created permanently or temporarily. The removal of the urine from the urinary tract can be induced by inserting the catheter into the widened renal pelvis or bladder via a surgical puncture. Those kind of stomas are usually temporary, but in some cases they have to be used permanently. In order to create a temporary stoma via a cutaneous puncture, some single-use sets are applied (such as Cystofix or Nefrofix) [13].

Permanent stomas are usually constructed using an insulated intestinal loop forming a conduit, whose one end (farther) is attached to the skin opening of the stoma, and the second one is attached to the ureters. This operation is called the Bricker procedure. Sometimes the cephalad end of the conduit is attached to the one or two renal pelvises (if the ureters cannot be used to direct the urine out) or bladder, if urinating through the urethra is not possible. [12,13]

Table 1. Urostomy types [13,14]

Stoma	**Characteristics**
Cystostomy	Perineal stomas – they are rarely permanent and consist in removing the urine via cutaneous puncture through the bladder
Nephrostomy	This temporary stoma, only rarely a permanent one, consists in removing the urine from the kidney via a cutaneous puncture of the pelvicalyceal system.
Surgical stomas (open - no urinary retention maintained)	
Ureterocutaneostomy	Usually permanent and bilateral attachment of ureters to a cutaneous opening in the abdomen
Trans-uretero-uretero-cutaneostomy	A permanent attachment of one ureter with a cutaneous opening in the abdomen – the flow of the urine from the opposite kidney is secured by the attachment of its ureter to the other ureter attached to the cutaneous opening
Uretero-entero-cutaneostomy; Bricker procedure	It consists in a permanent attachment of the ureters with the cephalad end of the insulated intestinal section (ileum, sigmoid, or transverse colon) which serves as a connector, as its farther end is attached to the cutaneous opening in the abdomen.
Vesicostomy	Usually a temporary stoma, applied most frequently in children. It consists in attaching the front upper bladder wall with a cutaneous opening in the abdomen.
Stomas applied to maintain urinary retention	
Continent reservoir	A permanent way to remove urine from a reservoir that replaces the bladder – ureters are attached to the reservoir, and the reservoir is linked to a cutaneous opening in the abdomen with an intestinal connector formed in such a way that urine storage and periodical removal using a catheter are possible.
Vesico-entero-cutaneostomy	A permanent way to remove urine from the bladder via a connector formed using an insulated ileum or appendix loop, and attached to the bladder on one end, and a cutaneous opening in the abdomen on the other. The intestinal connector is formed in such a way that urine storage and periodical removal using a catheter inserted to the bladder via the stoma.
Urethrostomy	Usually permanent (temporary in young boys) bulbar lateral attachment of an urethral section with a cutaneous opening on the perineum

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